CLAIMS

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1. A method of combating and controlling insects, acarines, nematodes or molluscs which comprises applying to a pest, to a locus of a pest, or to a plant susceptible to attack by a pest an insecticidally, acaricidally, nematicidally or molluscicidally effective amount of a compound of formula (I):

$$(R^{4})_{n} \qquad \qquad \begin{array}{c} R^{9} \qquad \qquad \\ N \qquad \qquad \\ N \qquad \qquad \\ R^{2} \qquad \qquad \\ R^{3} \qquad \qquad \\ Y - R^{1} \qquad (I)$$

wherein Y is a single bond, C=O, C=S or S(O)q where q is 0, 1 or 2; R¹ is hydrogen, optionally substituted alkyl, optionally substituted alkoxycarbonyl, optionally substituted alkylcarbonyl, aminocarbonyl, optionally substituted alkylaminocarbonyl, optionally substituted dialkylaminocarbonyl, optionally substituted aryl, optionally substituted heteroaryl, optionally substituted alkoxy, optionally substituted aryloxy, optionally substituted heteroaryloxy, optionally substituted heterocyclyloxy, cyano, optionally substituted alkenyl, optionally substituted alkynyl, optionally substituted cycloalkyl, optionally substituted cycloalkenyl, formyl, optionally substituted heterocyclyl, optionally substituted alkylthio, NO or NR¹³R¹⁴ where R¹³ and R¹⁴ are independently hydrogen, COR⁴⁰, optionally substituted alkyl, optionally substituted aryl, optionally substituted heteroaryl, optionally substituted heterocyclyl or R13 and R¹⁴ together with the N atom to which they are attached form a group -N=C(R⁴¹)-NR⁴²R⁴³; R² and R³ are independently hydrogen, halogen, cyano, optionally substituted alkyl, optionally substituted alkoxy, optionally substituted aryl or C(O)NR¹⁵R¹⁶ where R¹⁵ and R¹⁶ are independently hydrogen, optionally substituted alkyl, optionally substituted aryl, optionally substituted heteroaryl or optionally substituted heterocyclyl, or R² and R³ together are =O, or R² and R³ together with the atoms to which they are attached form a 4, 5, 6,or 7 membered carbocyclic or

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heterocyclic ring; each R4 is independently halogen, nitro, cyano, optionally substituted C₁₋₈ alkyl, optionally substituted C₂₋₆ alkenyl, optionally substituted C₂₋₆ alkynyl, optionally substituted alkoxycarbonyl, optionally substituted alkylcarbonyl, optionally substituted alkylaminocarbonyl, optionally substituted dialkylaminocarbonyl, optionally substituted C3-7 cycloalkyl, optionally substituted aryl, optionally substituted heteroaryl, optionally substituted heterocyclyl, optionally substituted alkoxy, optionally substituted aryloxy, optionally substituted heteroaryloxy, optionally substituted alkylthio or R¹⁹R²⁰N where R¹⁹ and R²⁰ are, independently, hydrogen, C₁₋₈ alkyl, C₃₋₇ cycloalkyl, C₃₋₆ alkenyl, C₃₋₆ alkynyl, C₃₋₇ cycloalkyl (C_{1-4}) alkyl, C_{2-6} haloalkyl, C_{1-6} alkoxy (C_{1-6}) alkyl, C_{1-6} alkoxycarbonyl or R¹⁹ and R²⁰ together with the N atom to which they are attached form a five, six or seven-membered heterocyclic ring which may contain one or two further heteroatoms selected from O, N or S and which may be optionally substituted by one or two C₁₋₆ alkyl groups, or 2 adjacent groups R⁴ together with the carbon atoms to which they are attached form a 4, 5, 6,or 7 membered carbocyclic or heterocyclic ring which may be optionally substituted by halogen; n is 0, 1, 2, 3 or 4; R⁸ is optionally substituted alkyl, optionally substituted alkenyl, optionally substituted alkynyl, optionally substituted cycloalkyl, optionally substituted aryl, optionally substituted alkoxy, optionally substituted aryloxy, optionally substituted alkoxycarbonyl, optionally substituted alkylcarbonyl or optionally substituted alkenylcarbonyl; R^9 and R^{10} are independently hydrogen, halogen, optionally substituted alkyl, optionally substituted aryl or R9 and R10 together form a group -CH2-, -CH=CH- or -CH2CH2-; R40 is H, optionally substituted alkyl, optionally substituted alkoxy, optionally substituted aryl, optionally substituted aryloxy optionally substituted heteroaryl, optionally substituted heteroaryloxy or NR⁴⁴R⁴⁵; R⁴¹, R⁴² and R⁴³ are each independently H or lower alkyl; R⁴⁴ and R⁴⁵ are independently optionally substituted alkyl, optionally substituted aryl or optionally substituted heteroaryl or salts or N-oxides thereof.

- 2. A method according to claim 1 wherein Y is a bond or is C=O.
- 3. A method according to claim 1 or claim 2 wherein R¹ is hydrogen, C₁₋₆ alkyl, C₁₋₆ cyanoalkyl, C₁₋₆ haloalkyl, C₃₋₇ cycloalkyl(C₁₋₄)alkyl, C₁₋₆ alkoxy(C₁₋₆)alkyl,

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heteroaryl(C₁₋₆)alkyl (wherein the heteroaryl group may be optionally substituted by halo, nitro, cyano, C1-6 alkyl, C1-6 haloalkyl, C1-6 alkoxy, C1-6 haloalkoxy, C1-6 alkylsulfonyl, C₁₋₆ alkylsulfinyl, C₁₋₆ alkylthio, C₁₋₆ alkoxycarbonyl, C₁₋₆ alkylcarbonylamino, arylcarbonyl, or two adjacent positions on the heteroaryl system may be cyclised to form a 5, 6 or 7 membered carbocyclic or heterocyclic ring, itself optionally substituted with halogen), aryl(C1-6)alkyl (wherein the aryl group may be optionally substituted by halo, nitro, cyano, C1-6 alkyl, C1-6 haloalkyl, C1-6 alkoxy, C1-6 haloalkoxy, C₁₋₆ alkylsulfonyl, C₁₋₆ alkylsulfinyl, C₁₋₆ alkylthio, C₁₋₆ alkoxycarbonyl, C₁₋₆ alkylcarbonylamino, arylcarbonyl, or two adjacent positions on the aryl system may be cyclised to form a 5, 6 or 7 membered carbocyclic or heterocyclic ring, itself optionally substituted with halogen), C1-6 alkylcarbonylamino(C1-6)alkyl, aryl (which may be optionally substituted by halo, nitro, cyano, C1-6 alkyl, C1-6 haloalkyl, C1-6 alkoxy, C₁₋₆ haloalkoxy, C₁₋₆ alkylsulfonyl, C₁₋₆ alkylsulfinyl, C₁₋₆ alkylthio, C₁₋₆ alkoxycarbonyl, C₁₋₆ alkylcarbonylamino, arylcarbonyl, or two adjacent positions on the aryl system may be cyclised to form a 5, 6 or 7 membered carbocyclic or heterocyclic ring, itself optionally substituted with halogen), heteroaryl (which may be optionally substituted by halo, nitro, cyano, C1-6 alkyl, C1-6 haloalkyl, C1-6 alkoxy, $C_{1\text{-}6}$ haloalkoxy, $C_{1\text{-}6}$ alkylsulfonyl, $C_{1\text{-}6}$ alkylsulfinyl, $C_{1\text{-}6}$ alkylthio, $C_{1\text{-}6}$ alkoxycarbonyl, C₁₋₆ alkylcarbonylamino, arylcarbonyl, or two adjacent positions on the heteroaryl system may be cyclised to form a 5, 6 or 7 membered carbocyclic or heterocyclic ring, itself optionally substituted with halogen), C1-6 alkoxy, C1-6 haloalkoxy, phenoxy (wherein the phenyl group is optionally substituted by halogen, C₁₋₄ alkyl, C₁₋₄ alkoxy, C₁₋₄ haloalkyl, C₁₋₄ haloalkoxy, CN, NO₂, aryl, heteroaryl, amino or dialkylamino), heteroaryloxy (optionally substituted by halo, nitro, cyano, C₁₋₆ alkyl, C₁₋₆ haloalkyl, C₁₋₆ alkoxy or C₁₋₆ haloalkoxy), heterocycyloxy (optionally substituted by halo, C_{1-6} alkyl, C_{1-6} haloalkyl, C_{1-6} alkoxy or C_{1-6} haloalkoxy), cyano, C₂₋₆ alkenyl, C₂₋₆ alkynyl, C₃₋₆ cycloalkyl, C₅₋₇ cycloalkenyl, heterocyclyl (optionally substituted by halo, nitro, cyano, C_{1-6} alkyl, C_{1-6} haloalkyl, C_{1-6} alkoxy or C_{1-6} haloalkoxy), C_{1-6} alkylthio, C_{1-6} haloalkylthio or $NR^{13}R^{14}$ where R^{13} and R^{14} are independently hydrogen, C2-6 alkyl, C2-6 haloalkyl, phenyl (which may be optionally substituted by halogen, C₁₋₄ alkyl, C₁₋₄ alkoxy, C₁₋₄ haloalkyl, C₁₋₄ haloalkoxy, CN, NO2, aryl, heteroaryl, amino, dialkylamino or C1-4 alkoxycarbonyl) or heteroaryl

(which may be optionally substituted by halo, nitro, cyano, C_{1-6} alkyl, C_{1-6} haloalkyl, C_{1-6} alkoxy or C_{1-6} haloalkoxy, C_{1-4} alkoxycarbonyl C_{1-6} alkylcarbonylamino, phenyloxycarbonylamino (wherein the phenyl group is optionally substituted by halogen, C_{1-4} alkyl, C_{1-4} alkoxy, C_{1-4} haloalkyl, C_{1-4} haloalkoxy, C_{1} , C_{1-4} haloalkylamino or phenylamino (wherein the phenyl group is optionally substituted halogen, C_{1-4} alkyl, C_{1-4} alkoxy, C_{1-4} haloalkyl, C_{1-4} haloalkoxy, C_{1} , C_{1-4} haloalkoxy, C_{1} , C_{1-4} haloalkoxy, C_{1} , C_{1} , heteroaryl, amino or dialkylamino).

- 4. A method according to any preceding claim wherin R² and R³ are are independently hydrogen or C₁₋₄ alkyl.
- A method according to any preceding claim wherein each R4 is independently 5. halogen, cyano, C₁₋₈ alkyl, C₁₋₈ haloalkyl, C₁₋₆ cyanoalkyl, C₁₋₆ alkoxy(C₁₋₆)alkyl, C₃₋₇ cycloalkyl(C_{1-6})alkyl, C_{5-6} cycloalkenyl(C_{1-6})alkyl, C_{3-6} alkenyloxy(C_{1-6})alkyl, C_{3-6} alkynyloxy(C_{1-6})alkyl, aryloxy(C_{1-6})alkyl, C_{1-6} carboxyalkyl, C_{1-6} alkylcarbonyl(C_{1-6}) 15 6) alkyl, C2-6 alkenylcarbonyl(C1-6) alkyl, C2-6 alkynylcarbonyl(C1-6)-alkyl, C1-6 alkoxycarbonyl(C₁₋₆)alkyl, C₃₋₆ alkenyloxycarbonyl(C₁₋₆)alkyl, C₃₋₆ alkynyloxycarbonyl(C_{1-6})alkyl, aryloxycarbonyl(C_{1-6})alkyl, C_{1-6} alkylthio(C_{1-6})alkyl, C_{1-6} alkylsulfinyl(C_{1-6})alkyl, C_{1-6} alkylsulfonyl(C_{1-6})alkyl, aminocarbonyl(C_{1-6})alkyl, C_{1-6} alkylaminocarbonyl(C_{1-6})alkyl, di(C_{1-6})alkylaminocarbonyl(C_{1-6})alkyl, 20 phenyl(C₁₋₄)alkyl (wherein the phenyl group is optionally substituted by halogen, C₁₋₄ alkyl, C₁₋₄ alkoxy, C₁₋₄ haloalkyl, C₁₋₄ haloalkoxy, CN, NO₂, aryl, heteroaryl, amino or dialkylamino), heteroaryl(C₁₋₄)alkyl (wherein the heteroaryl group is optionally substituted by halo, nitro, cyano, C1-6 alkyl, C1-6 haloalkyl, C1-6 alkoxy or C1-6 haloalkoxy), heterocyclyl(C1-4)alkyl (wherein the heterocyclyl group is optionally 25 substituted by halo, nitro, cyano, C1-6 alkyl, C1-6 haloalkyl, C1-6 alkoxy or C1-6 haloalkoxy), C2-6 alkenyl, aminocarbonyl(C2-6)alkenyl, C1-6 alkylaminocarbonyl(C2-6)alkenyl, di(C₁₋₆)alkylaminocarbonyl(C₂₋₆)alkenyl, phenyl(C₂₋₄)alkenyl, (wherein the phenyl group is optionally substituted by halogen, C₁₋₄ alkyl, C₁₋₄ alkoxy, C₁₋₄ haloalkyl, C1-4 haloalkoxy, CN, NO2, aryl, heteroaryl, amino or dialkylamino), C2-6 30 alkynyl, trimethylsilyl(C2-6)alkynyl, aminocarbonyl(C2-6)alkynyl, C1-6 alkylaminocarbonyl(C2-6)alkynyl, di(C1-6)alkylaminocarbonyl(C2-6)alkynyl, C1-6

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alkoxycarbonyl, C_{3-7} cycloalkyl, C_{3-7} halocycloalkyl, C_{3-7} cyanocycloalkyl, C_{1-3} alkyl(C_{3-7})-cycloalkyl, C_{1-3} alkyl(C_{3-7})halocycloalkyl,phenyl (optionally substituted by halogen, C₁₋₄ alkyl, C₁₋₄ alkoxy, C₁₋₄ haloalkyl, C₁₋₄ haloalkoxy, CN, NO₂, aryl, heteroaryl, amino or dialkylamino), heteroaryl (optionally substituted by halo, nitro, cyano, C₁₋₆ alkyl, C₁₋₆ haloalkyl, C₁₋₆ alkoxy or C₁₋₆ haloalkoxy), heterocyclyl (wherein the heterocyclyl group is optionally substituted by halo, nitro, cyano, C₁₋₆ alkyl, C₁₋₆ haloalkyl, C₁₋₆ alkoxy or C₁₋₆ haloalkoxy), or 2 adjacent groups R⁴ together with the carbon atoms to which they are attached form a 4, 5, 6, or 7 membered carbocylic or heterocyclic ring which may be optionally substituted by halogen, C₁₋₈ alkoxy, C₁₋₆ haloalkoxy, phenoxy (optionally substituted by halo, nitro, cyano, C₁₋₆ alkyl, C1-6 haloalkyl, C1-6 alkoxy or C1-6 haloalkoxy), heteroaryloxy (optionally substituted by halo, nitro, cyano, C₁₋₆ alkyl, C₁₋₆ haloalkyl, C₁₋₆ alkoxy or C₁₋₆ haloalkoxy), C₁₋₈ alkylthio or R¹⁹R²⁰N where R¹⁹ and R²⁰ are, independently, hydrogen, C_{1-8} alkyl, C_{3-7} cycloalkyl, C_{3-6} alkenyl, C_{3-6} alkynyl, C_{2-6} haloalkyl, C_{1-6} alkoxycarbonyl or R19 and R20 together with the N atom to which they are attached form a five, six or seven-membered heterocyclic ring which may contain one or two further heteroatoms selected from O, N or S and which may be optionally substituted by one or two C_{1-6} alkyl groups; n is 0, 1, 2, 3 or 4.

A method according to any preceding claim wherin R^8 is C_{1-10} alkyl, C_{1-10} haloalkyl, 6. 20 aryl(C₁₋₆)alkyl (wherein the aryl group is optionally substituted by halogen, C₁₋₄ alkyl, C₁₋₄ alkoxy, C₁₋₄ haloalkyl, C₁₋₄ haloalkoxy, CN, NO₂, aryl, heteroaryl, amino or dialkylamino), heteroaryl(C_{1-6})alkyl (wherein the heteroaryl group is optionally substituted halogen, C₁₋₄ alkyl, C₁₋₄ alkoxy, C₁₋₄ haloalkyl, C₁₋₄ haloalkoxy, CN, NO₂, aryl, heteroaryl, amino or dialkylamino), arylcarbonyl-(C₁₋₆)alkyl (wherein the 25 aryl group may be optionally substituted by halogen, C1-4 alkyl, C1-4 alkoxy, C1-4 haloalkyl, C1-4 haloalkoxy, CN, NO2, aryl, heteroaryl, amino or dialkylamino and the alkyl group may be optionally substituted by aryl), C2-8 alkenyl, C2-8 haloalkenyl, aryl(C₂₋₆)alkenyl (wherein the aryl group is optionally substituted halogen, C₁₋₄ alkyl, C₁₋₄ alkoxy, C₁₋₄ haloalkyl, C₁₋₄ haloalkoxy, CN, NO₂, aryl, heteroaryl, amino or 30 dialkylamino, C₁₋₆ alkoxycarbonyl, or two adjacent substituents can cyclise to form a 5, 6 or 7 membered carbocyclic or heterocyclic ring), C₂₋₆ alkynyl, phenyl(C₂.

6)alkynyl (wherein the phenyl group is optionally substituted by halogen, C_{1-4} alkyl, C_{1-4} alkoxy, C_{1-4} haloalkyl, C_{1-4} haloalkoxy, C_{1} , C_{1-6} alkoxycarbonyl, C_{1-6} alkylcarbonyl, C_{1-6} haloalkylcarbonyl or aryl(C_{2-6})alkenylcarbonyl (wherein the aryl group may be optionally substituted halogen, C_{1-4} alkyl, C_{1-4} alkoxy, C_{1-4} haloalkyl, C_{1-4} haloalkoxy, C_{1} , C_{1-4} haloalkoxy, C_{1} , C_{1-4} haloalkoxy, C_{1} , C_{1-2} alkyl, C_{1-2} alkyl or C_{1-2} alkyl or C_{1-2} alkyl or C_{1-2} alkyl or optionally substituted heteroaryl.

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- 7. A method according to any preceding claim wherin R⁹ and R¹⁰ are both hydrogen.
- 8. A compound of formula IK

$$R^{9}$$
 R^{8}
 R^{10}
 R^{2}
 R^{3}
 $Y-R^{1}$

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wherein Y is a single bond, C=O or $S(O)_q$ where q is 0, 1 or 2; R^1 is C_{1-8} alkyl, C_{1-6} haloalkyl, C_{1-6} cyanoalkyl, C_{3-7} cycloalkyl(C_{1-6})alkyl, C_{1-6} alkoxy(C_{1-6})alkyl, C_{3-6} alkenyloxy-(C_{1-6})alkyl, C_{3-6} alkynyloxy(C_{1-6})alkyl, aryloxy(C_{1-6})alkyl, C_{1-6} carboxyalkyl, C_{1-6} alkylcarbonyl(C_{1-6})alkyl, C_{2-6} alkenyloarbonyl(C_{1-6})alkyl, C_{1-6} alkoxycarbonyl(C_{1-6})alkyl, C_{3-6} alkynyloxycarbonyl(C_{1-6})alkyl, C_{3-6} alkynyloxycarbonyl(C_{1-6})alkyl, aryloxycarbonyl(C_{1-6})alkyl, C_{1-6} alkylthio(C_{1-6})alkyl, C_{1-6} alkylsulfinyl(C_{1-6})alkyl, aminocarbonyl(C_{1-6})alkyl, C_{1-6} alkylaminocarbonyl(C_{1-6})alkyl, di(C_{1-6})alkylaminocarbonyl(C_{1-6})alkyl, phenyl(C_{1-4})alkyl (wherein the phenyl group is optionally substituted by halogen, nitro, cyano, C_{1-6} alkyl, C_{1-6} haloalkyl, C_{1-6} alkoxy or C_{1-6} haloalkoxy), heteroaryl(C_{1-4})alkyl (wherein the heteroaryl group may

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be substituted by halogen, nitro, cyano, C_{1-6} alkyl, C_{1-6} haloalkyl, C_{1-6} alkoxy or C_{1-6} haloalkoxy), heterocyclyl(C1.4)alkyl (wherein the heterocyclyl group may be substituted by halogen, cyano, C_{1-6} alkyl, C_{1-6} haloalkyl, C_{1-6} alkoxy or C_{1-6} haloalkoxy), phenyl (optionally substituted by halogen, nitro, cyano, C1-6 alkyl, C1-6 haloalkyl, C₁₋₆ alkoxy or C₁₋₆ haloalkoxy), heteroaryl (optionally substituted by halogen, nitro, cyano, C1-6 alkyl, C1-6 haloalkyl, C1-6 alkoxy or C1-6 haloalkoxy), C1-6 alkoxy, C_{1-6} haloalkoxy, C_{2-6} alkenyl, C_{2-6} haloalkenyl, C_{2-6} cyanoalkenyl, C_{2-6} alkynyl, C3-7 cycloalkyl, formyl, heterocyclyl (optionally substituted by halogen, nitro, cyano, C_{1-6} alkyl, C_{1-6} haloalkyl, C_{1-6} alkoxy or C_{1-6} haloalkoxy) or C_{1-6} alkylthio; \mathbb{R}^2 and R3 are independently hydrogen or C1-4 alkyl; each R4 is independently halogen, cyano, C₁₋₁₀ alkyl optionally substituted by C₁₋₆ alkoxy, halogen, phenyl (itself optionally substituted by halogen, C₁₋₄ alkyl or C₁₋₄ alkoxy), C₂₋₆ alkenyl optionally substituted by C₁₋₆ alkoxy, halogen, phenyl (itself optionally substituted by halogen, C_{1-4} alkyl or C_{1-4} alkoxy) or C_{2-6} alkynyl optionally substituted by C_{1-6} alkoxy, halogen, phenyl (itself optionally substituted by halogen, C1-4 alkyl or C1-4 alkoxy); n is 0, 1, 2, 3 or 4; R^8 is C_{1-10} alkyl optionally substituted by C_{1-6} alkoxy, halogen or phenyl (itself optionally substituted by halogen, C1-4 alkyl or C1-4 alkoxy), C2-6 alkenyl optionally substituted by C₁₋₆ alkoxy, halogen or phenyl (itself optionally substituted by halogen, C1-4 alkyl or C1-4 alkoxy) or C2-6 alkynyl optionally substituted by C₁₋₆ alkoxy, halogen or phenyl (itself optionally substituted by halogen, C₁₋₄ alkyl or C₁₋₄ alkoxy); R⁹ and R¹⁰ are both hydrogen; and salts or N-oxides thereof provided that R8 is not methyl and YR1 is not SO2CH3, methyl, ethyl, phenyl or fluorosubstituted phenyl.

25 9. A compound of formula (11)

where R^8 is phenyl(C_{2-4})alkenyl (wherein the phenyl group is optionally substituted by halogen, C_{1-4} alkyl, C_{1-4} alkoxy, C_{1-4} haloalkyl, C_{1-4} haloalkoxy, CN, NO₂, aryl, heteroaryl, amino or dialkylamino); or a compound of formula (10)

where R^8 is phenyl(C_{2-4})alkenyl (wherein the phenyl group is optionally substituted by halogen, C_{1-4} alkyl, C_{1-4} alkoxy, C_{1-4} haloalkyl, C_{1-4} haloalkoxy, CN, NO₂, aryl, heteroaryl, amino or dialkylamino); or a compound of formula (9)

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where R^2 is as defined for formula (I) in claim 1 and R^8 is phenyl(C_{2-4})alkenyl (wherein the phenyl group is optionally substituted by halogen, C_{1-4} alkyl, C_{1-4} alkoxy, C_{1-4} haloalkyl, C_{1-4} haloalkoxy, CN, NO₂, aryl, heteroaryl, amino or dialkylamino); or a compound of formula (9A)

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where R^2 and where $(R^4)n$ are as defined for formula (I) in claim 1 and R^8 is phenyl(C_{2-4})alkenyl (wherein the phenyl group is optionally substituted by halogen, C_{1-1})

4 alkyl, C₁₋₄ alkoxy, C₁₋₄ haloalkyl, C₁₋₄ haloalkoxy, CN, NO₂, aryl, heteroaryl, amino or dialkylamino).

An insecticidal acaricidal and nematicidal composition comprising an insecticidally, acaricidally or nematicidally effective amount of a compound of formula I as defined in claim 1.

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